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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/987,914	11/16/2001	Takayuki Oshima	HITA-0120	7936

7590 03/17/2004

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EXAMINER

BREWSTER, WILLIAM M

ART UNIT	PAPER NUMBER
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2823

DATE MAILED: 03/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

94

Office Action Summary**Application No.**

09/987,914

Applicant(s)

OSHIMA ET AL.

Examiner

William M. Brewster

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 and 28-42 is/are pending in the application.
- 4a) Of the above claim(s) 1-17 and 28-37 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 38-42 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Prosecution Application

The request filed on 5 January 2003 for a Continued Prosecution Application (CPA) under 37 CFR 1.53(d) based on parent Application No. 09/987,914 is acceptable and a CPA has been established. An action on the CPA follows.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 38, 39, 41, 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aug et al., U.S. Patent No. 6,284,644 in view of Komada, U.S. Patent No. 6,627,554 B1.

Aug teaches a method of fabricating a semiconductor integrated circuit device, comprising: (a) in fig. 4, forming a lower layer dielectric film 16 including a first silicon oxide film containing fluorine over a major surface of a wafer 10, col. 3, lines 35 - 45; (b) forming an upper layer dielectric film 22, col. 4, lines 26-31, including a second silicon oxide film substantially without fluorine as compared with the first silicon oxide film over the first oxide film, the upper and lower layer dielectric film constituting an

inter-layer dielectric film having an inter-wiring layer portion and an inter-via layer portion respectively ;

limitations from claim 39, 41: in fig. 4, wherein a stopper dielectric film 20, is formed between the inter-wiring layer portion and the inter-via layer portion, wherein the stopper film is a SiN film, col. 3, lines 46-62;

(c) in fig. 6, forming via holes 26 through said upper dielectric film and lower dielectric film and then forming wiring grooves in the upper dielectric film, wherein at least one of said wiring grooves includes one of said via holes in a groove pattern (d) forming a barrier 34 on said wiring grooves and via holes, col. 4, lines 60-65, and then filling the wiring groove and the via hole with copper so as to form an embedded wiring and a copper plug electrically connecting the embedded wiring to lower wiring, wherein Young's modulus of the lower dielectric film as a whole is smaller than that of the upper dielectric film.

Aug does not specify forming a barrier metal in the wiring and via holes, but Komada does. Komada teaches a method of fabricating a semiconductor device film, in fig. 3A, with forming a lower dielectric film 4B, an upper dielectric film 9, an upper and lower layer dielectric films constituting an inter layer dielectric film having an inter-wiring layer portion 12 and an inter-via layer portion; forming a wiring groove and, a via hole in the inter-layer dielectric film in such a manner that the wiring groove is formed through the second oxide film and the via hole is formed through the first oxide film, forming a barrier metal 5 and 11, along said wiring grooves and via holes, and then filling with a conductive metal, col. 4, line 46 - col. 5, line 25. It would have been obvious to a person

of ordinary skill in the art at the time the invention was made to recognize that combining Komada's process with Aug's invention would have been beneficial because the barrier metal increases the adhesion of the metal to the sidewalls.

Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aug in view of Komada as applied to claim 38, 39, 41, 42 above, and further in view of Huang, U.S. Patent No. 6,177,364 B1.

Aug and Komada do not specify a stopper film of SiC, but Huang does. Huang teaches a method of fabricating a semiconductor device film, in fig. 1A, with forming a lower dielectric film 120, a stopper film 130 of SiC, col. 2, line 57 - col. 3, line 6, an upper dielectric film 140, in fig. 1B, an upper and lower layer dielectric films constituting an inter layer dielectric film having an inter-wiring layer portion 210 and an inter-via layer portion 230, col. 2, line 57- col. 3, line 50; forming a wiring groove and, a via hole in the inter-layer dielectric film in such a manner that the wiring groove is formed through the second oxide film and the via hole is formed through the first oxide film, and in fig. 1D, filling with copper, col. 5, lines 31-50. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to recognize that combining Huang's process with Aug's and Komada's invention would have been beneficial because SiC gives a different etching rate, which may be of advantage with different ILD materials.

Response to Arguments

Applicant's arguments with respect to all current claims have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William M. Brewster whose telephone number is 571-272-1854. The examiner can normally be reached on Full Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

William M. Brewster

12 March 2004
WB